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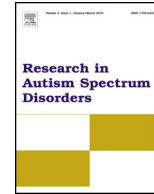
Teaching social–emotional skills to school-aged children with Autism Spectrum Disorder: A treatment versus control trial in 41 mainstream schools

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ABSTRACT

This study examined the effectiveness of 'Emotion-Based Social Skills Training (EBSST)' a manualised social–emotional intervention designed to improve emotional competence in school-aged children with Autism Spectrum Disorder (ASD). Participants were 217 children (aged 7–13 years) with ASD without Intellectual Disability attending 41 mainstream primary schools in NSW Australia. Data on emotional competence, social skills and mental health difficulties were collected using teacher and parent informant report questionnaires in a pre-test/post-test control group design. One hundred and six students took part in the treatment and 111 students were in the control group. School Counsellors delivered the 16 session treatment to groups of 3–8 students in their schools. Teachers and parents also received six sessions of EBSST in separate groups. Participants received a booster session at six months follow-up. EBSST improved teacher reported emotional competence as measured by the Emotions Development Questionnaire (EDQ). The effect size was large and improvements were sustained at 6 months follow-up. Parent reported emotional competence and more general measures of social skills and mental health were insensitive to change across informants. This study has important implications for students, teachers and parents and provides a valuable basis for further research and development of EBSST and the EDQ.

There has been increasing interest in school-based interventions designed to promote social–emotional competence in typically developing (TD) children in recent years (Humphrey, Curran, Morris, Farrell, & Woods, 2007). Proponents of such interventions point to a range of benefits for TD children including improved social–emotional competence, positive social behaviour, and better academic performance (Humphrey et al., 2007).

Children with Autism Spectrum Disorder (ASD) are at particular risk of social–emotional difficulties. Compared to their TD peers, children with ASD have been found to have difficulties encoding social information (Embregts & van Nieuwenhuijzen, 2009; Ziv, Hadad, & Khateeb, 2014), impaired visual perspective taking (de, Brindley, & Frith, 2009; Warreyn, Roeyers, Oelbrandt, & De Groote, 2005), poor social functioning and limited play (Anderson, Moore, Godfrey, & Fletcher-Flinn, 2004),

impaired non-verbal expression of emotion (McGee, Feldman, & Chernin, 1991) poor social problem solving (Bernard-Opitz, Sriram, & Nakhoda-Sapuan, 2001) and difficulties exhibiting pro-social behaviour (Ziv et al., 2014). Social–emotional difficulties have been found to differentiate children with ASD from those with other developmental disorders (Klin et al., 2007).

Approximately one in seven TD children have a mental health disorder, and poor social and emotional competence has been associated with mental health, personal, social, and academic difficulties (Eisenberg, 2006; Masten & Coatsworth, 1998; Weissberg & Greenberg, 1998). By comparison, around seven in 10 children with ASD have a mental health disorder (Brereton, Tonge, & Einfeld, 2006; Leyfer et al., 2006). Although mental health problems in children with ASD are poorly understood (Ghaziuddin, Ghaziuddin, & Greden, 2002) the association between mental wellbeing and social–emotional skills in TD children (Becker, Luebbe, & Langberg, 2012; Merrell & Gueldner, 2010; Mosley, 2009; Schick & Cierpka, 2013; Sklad, Diekstra, De Ritter, Ben, & Gravesteijn, 2012) implies poor social–emotional competence may be a contributing factor to the very high levels of mental health issues in children with ASD.

ASD affects approximately 51 per 10,000 children in Australia (Parner et al., 2011) and prevalence rates have increased dramatically in recent years (Matson & Kozlowski, 2011). Most children with ASD, particularly those without co-morbid Intellectual Disability (ID), attend 'mainstream' schools. Thus, there is a critical need for evidence-based school-based interventions to promote social–emotional learning in children with ASD. However, to date, many of the existing social–emotional programmes available in schools are targeted at TD children (Humphrey et al., 2007) and do not cater to the learning needs of children with ASD. In all areas of learning, children with ASD benefit most from 'visual' teaching strategies including video modelling (Ayres & Langone, 2005; Lantz, 2005; McCoy & Hermansen, 2007; Reichow & Volkmar, 2010), social stories (Ozdemir, 2008; Sansosti & Powell-Smith, 2008; Scattone, 2007), scripts (Ganz & Flores, 2008) and visual activity schedules (Betz, Higbee, & Reagon, 2008) to support their learning. When teaching social skills, school-aged children with ASD benefit from social skills groups (Reichow & Volkmar, 2010; Williams-White, Keonig, & Scahill, 2007) and peer mediated approaches (Bass & Mulick, 2007). Parental involvement and training in social skills interventions may enhance generalisation of skills (Brookman-Frazee, Stahmer, Baker-Ericzen, & Tsai, 2006) which can be more difficult for children with ASD. Of the existing social–emotional interventions available for children with ASD, most have focused on improving pragmatic social skills rather than developing emotional competence, and few programmes provide a comprehensive curriculum based on evidence-based teaching strategies (Matson, Matson, & Rivet, 2007; McConnell, 2002; Reichow & Volkmar, 2010; Scattone, 2007).

1. Emotion-Based Social Skills Training (EBSST)

Emotion-Based Social Skills Training (Wong, Lopes, & Heriot, 2010) aims to enhance emotional competence in primary school aged children with ASD. EBSST draws on theories of emotional development and emotional intelligence (Mayer, Salovey, & Caruso, 2000) to teach children with ASD how to understand their own and other's emotions, emotional problem solving and emotional regulation skills. EBSST is a comprehensive curriculum, which utilises a multi-faceted approach to cater to the learning needs of children with ASD (Ratcliffe, 2011).

EBSST was originally developed for children with ASD without ID aged 8–14 years for delivery by psychologists in small groups of children and parents in an outpatient setting (Wong et al., 2010). EBSST has been studied in several preliminary clinical studies evaluating teaching content, teaching materials and outcome measures. A modified version of EBSST, EBSST for ASD and Mild ID (Ratcliffe, Grahame, & Wong, 2010) has been described in a case study (Ratcliffe, 2011). In these pilot studies, EBSST showed promising clinically significant treatment benefits, but has yet to be rigorously evaluated.

In this study, in order to meet the strong need for an evidence-based social–emotional programme for children with ASD in mainstream schools, EBSST was adapted for delivery in schools by School Counsellors for a large treatment versus control trial.

1.1. Emotions Development Questionnaire

Appropriate outcome measures are essential to assess the effectiveness of social–emotional treatments for children with ASD (McConnell, 2002). However, ASD researchers and clinicians tend to rely on measures used for TD children. In regard to mental health, measures designed for TD children have been found to be helpful as outcome measures for treatments targeting clinical samples of children with ASD and co-morbid mental health issues (Chalfant, Rapee, & Carroll, 2007). However, such measures may not be sensitive enough to detect change in mental health as a result of a treatment designed for a non-clinical sample. Similarly, social skills studies often employ measures of pragmatic social skills (Laugeson, Frankel,

1.2. Current study

The primary aim of this study was to evaluate the effectiveness of delivering EBSST to students, their parents and teachers by school counsellors in schools. It was hypothesised that students in the treatment group would improve on teacher and parent reported measures of emotional competency, social skills and mental health, from pre-treatment to post-treatment compared to the control group. It was further hypothesised that any treatment gains made by the treatment group would be maintained at 6 months follow-up.

A secondary aim of this study was to evaluate the sensitivity and utility of the EDQ as an outcome measure for EBSST. It was hypothesised that the EDQ, as a measure of emotional development designed for children with ASD, would be a more sensitive measure of change in this school-based community sample of students with ASD than measures of social skills and mental health designed for TD children.

2. Methods

2.1. Design

A quasi-experimental design was implemented for the purposes of the evaluation. There was one between-participants factor (group: treatment vs. control), and one within-participants factor: (time: pre-test vs. post-test) for each domain (emotional competence, social skills and mental health).

Random assignment to treatment and comparison groups was not feasible or practical given the limited financial and staff resources available to conduct this 'real-world' field study in a complex educational environment. School counsellors nominated themselves to facilitate EBSST groups. They also nominated 3–8 eligible children in their schools to participate. Groups were allocated to treatment versus control based on availability of counsellors, schools and eligible participants. Whilst this process did have the potential to influence treatment and control group equivalence, analysis indicated that groups did not differ on sex, age, autism severity, or pre-test dependent measures (see Sections 2.2 and 3).

2.2. Participants

Forty-one school counsellors from mainstream metropolitan and regional NSW Department of Education and Communities (DEC) schools nominated themselves and students in their schools to participate. DEC school counsellors are trained as classroom teachers with post-qualification training in psychology.

Of the 217 student participants, 106 students, their parents and teachers took part in the treatment and 111 students were in the control group. This study pre-dated the released of the fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2013). Therefore, for the purposes of this study, participants were eligible if they had a confirmed or suspected diagnosis of any of the three ASD subtypes contained in the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV): Autistic Disorder, Asperger's Disorder or Pervasive Developmental Disorder, Not Otherwise Specified (PDDNOS; (American Psychiatric Association, 2000) and no known ID. Assessment and diagnosis of ASD was made and documented prior to the study by a specialist medical practitioner or registered psychologist with appropriate clinical experience and relevant reports documenting students' diagnoses were placed on students' school files. School counsellors reviewed students' school files to confirm eligibility. Parents' pre-treatment T-scores on the Social Responsiveness Scale (SRS) (Constantino, 2002) were in the severe range for every participant, which is strongly associated with a diagnosis of Autism. This gives an indication of the validity of school counsellor file reviews. Additional participant demographic information is displayed in Table 1 below.

Preliminary Chi-square analyses indicated that there were no significant differences between the treatment and comparison groups in terms of gender ($p > 0.05$). Independent samples t-tests indicated that there was no significant difference between the two groups in terms of age ($p > 0.05$) or parent SRS T scores ($p > 0.05$).

2.3. Ethics

Consent was sought from school counsellors, school principals, parents and teachers for all students involved. The study had ethics approval from the Human Research Ethics Committee at the Children's Hospital at Westmead, and was endorsed by the University of Sydney Human Ethics Committee.

2.4. Measures

2.4.1. Demographic questionnaire

School counsellors, teachers and parents all completed brief background information surveys to obtain general demographic information.

2.4.2. Autism severity

The SRS (Constantino, 2002) is a standardised, norm-referenced questionnaire designed to capture the severity of autistic behaviours in 4–18 year olds. The SRS can be used as an effective screener in educational settings and as an aid to clinical diagnosis (Wilkinson, 2010a, 2010b). The SRS items measure the ASD symptoms in the domains of social awareness, social information processing, reciprocal social communication, social anxiety/avoidance, and stereotypic behaviour/restricted interests. The scale demonstrates strong inter-rater reliability, acceptable internal consistency, and correlates highly with the Autism Diagnostic Interview-Revised (Rutter, Le Couteur, & Lord, 2003). The authors report satisfactory psychometric properties for the instrument: Cronbach's alpha = 0.97; test–retest reliability $r = 0.88$; inter-rater reliability, parents and teachers $r = 0.73$ (Constantino, 2002).

2.4.3. Emotional competence

Emotional competence was assessed using the teacher and parent informant report versions of the EDQ (Wong et al., 2009). The EDQ is a measure of emotional competence, which was designed for the study to specifically examine competency in the skills taught in EBSST for children aged 4–18 years. The EDQ was derived from a literature review of theories of emotional intelligence, emotional competence and developmental theory. This resulted in the development of items to assess the following constructs: emotional understanding, empathy/theory of mind, emotion regulation and parent emotion coaching skills. Items were generated by expert child psychologists and psychiatrists and piloted on a small group of parents of children with ASD. The constructs and items of the EDQ were reassessed and refined, based on clinical consensus. The EDQ was designed as an overall measure of a child's emotional competence, and each of the domains it assesses maps onto EBSST Modules.

The EDQ consisted of 40 items. Item responses were summed to give an overall indication of emotional competence. Higher scores indicated better emotional skills. Responses were circled on a 5 point Likert scale. A sixth option of 'don't know' was included in the Likert scale. The questionnaire took approximately 15 min to complete. The parent and teacher forms contained the same items although in the parent form the items referred to "your child" whereas in the teacher for the items referred to "your student". The questionnaire demonstrated excellent internal consistency, with a Cronbach's alpha of 0.92 for teachers and 0.91 for parents for the population in this study. Support for the concurrent validity of the EDQ was provided by the strong relationship between teachers' ratings on this measure, and their scores on the SSIS, $r = 0.27$, $p < 0.001$. Moreover, there was a strong relationships between parents' ratings on the EDQ and their scores on the SSIS, $r = 0.54$, $p < 0.001$ and the SDQ, $r = 0.36$, $p < 0.001$. The EDQ constructs and example items are included in Table 2 below.

2.4.4. Social skills

Overall social skills were assessed using the teacher and parent report versions of the Social Skills Improvement System – Rating Scales (SSIS-RS) (Gresham & Elliott, 2008), The SSIS-RS is a standardised norm referenced assessment of social skills for children and youth aged 3–18 years. Participants received a total social skills score, which included the subscales of

Table 2
Emotions Development Questionnaire (EDQ) domain and example items.

Domain	Example items

communication, cooperation, assertion, responsibility, empathy, engagement, and self-control. The total score was utilised to provide an overview of participant's overall social skills. The SSIS-RS shows strong psychometric properties in terms of internal consistency and test–retest reliability estimates. Median scale reliabilities of the social skills scale are in the mid- to upper 0.90s for every age group on each form. Median subscale reliabilities are in the high 0.80s for the Teacher Form and the mid-0.80s for the Parent Form. All alpha coefficients are equal to or exceed 0.70. Test–retest indices for Total Social Skills were 0.82 for the Teacher Form and 0.84 for the Parent Form (Gresham, Elliott, Vance, & Cook, 2011).

2.4.5. Mental health difficulties

Mental health difficulties were measured using the teacher and parent informant report versions of the Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997). The SDQ is a well-known, brief behavioural screening profile of children aged 5–16 years and is commonly used in Australian clinical practice (Hawes & Dadds, 2004). The instrument produces scores for each of five subscales: conduct problems; hyperactivity; emotional symptoms; peer problems; and prosocial behaviour. Each of these consists of five items. A 'total difficulties' score is calculated by totalling the four deficit focused subscales (i.e. all except for prosocial behaviour), Participants' total difficulties score were utilised to provide an indication of overall mental health. The SDQ is psychometrically sound with satisfactory reliability and validity. Mean Cronbach's alpha is 0.73, mean cross-informant correlation is 0.34 and mean retest stability after 4–6 months is 0.62 (Goodman, 2001).

2.5. Emotion-Based Social Skills Training (EBSST)

EBSST (Wong et al., 2010) aims to teach children with ASD skills in emotional competence. EBSST is divided into three modules, teaching emotional competence skills in understanding own and others' emotions, emotional problem solving and theory of mind, and emotion regulation skills, following a developmental framework. The EBSST curriculum is outlined in Table 3 below.

EBSST is a manualised intervention and each session followed a similar structure (Wong et al., 2010). During each student session, various concrete visual supports such as video social stories, worksheets, drawing, activities and role plays were utilised, to account for the visual and concrete learning style of children on the Autism Spectrum. Ratcliffe (2011) provides further examples of visual teaching strategies in EBSST. Visual supports including a visual schedule, rule chart and reward chart for following rules were utilised as environmental supports based on the application of the principles of positive behaviour support (McVilly, 2003).

EBSST was originally developed for use in a clinic setting and was adapted for use in schools. The adaptation from the original to the school-based programme primarily involved changes to examples provided to be more appropriate to the school setting and scheduling of sessions to fit in with the school terms in schools in NSW, Australia. Differences between the original and school-based programmes are outlined in Table 4.

2.6. Procedure

School counsellors received a complete EBSST kit and completed two days of skill-based training by the authors of the EBSST at the Children's Hospital at Westmead prior to running EBSST groups. Training included didactic instruction, videos, live demonstrations, role play, an in vivo evaluation and written exam to ensure counsellors were familiar with the manualised EBSST programme. School counsellors also received access to an online support forum and had telephone and email contact with the trainers to support them in the programme implementation.

All participating school counsellors were sent data collection packs for each participant. Packs contained copies of the demographic and outcomes measures for teachers and parents to complete prior to commencing EBSST, immediately after EBSST, and following the 6-month EBSST booster session. School counsellors administered and collected all assessment information. School counsellors then forwarded de-identified, coded assessment protocol to the Children's Hospital at Westmead where clinical psychologists scored the assessment measures and entered the data into a database.

EBSST was run in small groups of 3–8 participants. Students participating in EBSST were withdrawn from class at an agreed day/time each week. The treatment sessions were typically delivered in a quiet room, away from the regular classroom, that had access to a video and whiteboard.

The 16 session treatment was divided into three modules over three school terms, including one follow-up booster session at 6-months post-treatment. Within each of the three Modules, students received weekly 90 min sessions for five consecutive weeks. Teachers and parents received a session prior to and following each module, and a booster session at 6-month follow-up.

Table 4
Summary of EBSST in schools curriculum.

Group	Sessions	Curriculum
Module 1		
Child	5 × 90 min weekly sessions	Identifying emotions
		○ Labelling and rating the intensity of 4 primary emotions (happy, sad, worried, angry) in self and others using a 'feelings strength bar'
		○ Linking emotions with situational and body cues
Parent	2 × 90 min sessions[a]	Psychoeducation
Teacher	2 × 90 min sessions[a]	Psychoeducation
Module 2		
Child	5 × 90 min weekly sessions	Emotional problem solving
		○ Recognising emotional problems, generating, selecting and implementing helpful solutions.
		Understanding others' emotions
		○ What others think and feel depends on what they see, hear and experience
Parent	2 × 90 min sessions[a]	Parent Cognitive Behaviour Therapy (CBT)
Teacher	2 × 90 min sessions[a]	Parent Cognitive Behaviour Therapy (CBT)
Module 3		
Child	5 × 90 min weekly sessions	Managing emotions
		○ Emotion regulation strategies using a 'feelings control kit'
		○ Cognitive strategies include changing unhelpful thoughts to helpful thoughts, emotional problem solving
		○ Behavioural strategies include deep breathing, relaxation, distraction
Parent	2 × 90 min sessions[a]	Training parents as 'Emotion Coaches'
Teacher	2 × 90 min sessions[a]	Training teachers as 'Emotion Coaches'
Booster session		
Child	1 × 90 min session	Skills consolidation
Parent	1 × 90 min session	Training in self-monitoring and evaluation
Teacher	1 × 90 min session	Training in self-monitoring and evaluation

[a] One parent and one teacher session were held prior to and following the child sessions.

All student, teacher and parent sessions were facilitated by the School Counsellor, with assistance from a member of school staff, most typically a teacher or teacher's aide.

2.7. Statistical method

All statistical analyses were conducted using the SPSS software programme. Alpha was set to 0.05 for all analyses, unless otherwise stated. The Bonferroni adjustment was made where appropriate to adjust for multiplicity. To evaluate the effectiveness of delivering EBSST in schools, independent samples t-tests were conducted to compare the mean change in scores from pre-treatment to post-treatment for the treatment versus the control group on the emotional competence, social skills and mental health outcome measures, based on teacher and parent report. For significant results, Eta-squared (η^2) was used to provide an estimate of the effect size.

Six month follow-up data was available for the treatment group, but not the control group, as for ethical reasons, the control group were offered EBSST at the conclusion of their wait period. To assess whether any treatment effects were maintained in the treatment group over time, one-way repeated measures ANOVAs were conducted for outcomes measures for pre-treatment, post-treatment and 6 months follow-up. Post hoc repeated measures t-tests were used to further analyse significant results in order to detect which scores differed from one another.

Preliminary analyses were conducted to ensure no violation of the assumptions of normality.

Table 5
Teacher and parent outcome measures' intercorrelations and internal reliability.

Outcome measure	1	2	3	4	5	6	Cronbach's α
1. EDQ-T	–						0.92
2. EDQ-P	−0.04	–					0.91
3. SSIS-T	0.27[**]	0.10	–				0.84
4. SSIS-P	−0.01	0.54[**]	0.21[**]	–			0.76
5. SDQ-T	−0.02	−0.11	−0.60[**]	−0.18[*]	–		0.74
6. SDQ-P	−0.13	−0.36[**]	−0.23[**]	−0.63[**]	0.33[**]	–	0.65

Note: EDQ-T: Emotions Development Questionnaire – Teacher form; EDQ-P: Emotions Development Questionnaire – Parent form; SSIS-T: Social Skills Improvement System – Rating Scales – Teacher form; SSIS-P: Social Skills Improvement System – Rating Scales – Parent form; SDQ-T: Strengths and Difficulties Questionnaire – Teacher form; SDQ-P: Strengths and Difficulties Questionnaire – Parent form.

* $p < 0.05$, two-tailed.
** $p < 0.01$, two-tailed.

Cronbach's alpha scores were computed for the various measures used to assess the internal consistency of responses given in the current data-set (see Table 5). For the EDQ, internal consistency was excellent. Internal consistency for the SSIS and SDQ was also acceptable.

Correlations between the three outcome measures were obtained to provide an indication of concurrent validity (see Table 5). For teacher report there was a small correlation between the EDQ and the SSIS and no correlation between the EDQ and the SDQ. For parent report there was a large correlation between the EDQ and the SSIS and a medium correlation between the EDQ and the SDQ.

Intra class correlation coefficients were calculated to obtain an estimate of inter-rater reliability between teachers as compared with parents on the various outcome measures. Results are presented in Table 6. Inter-rater agreement was found to be low for all measures, particularly the EDQ.

3.2. Teacher ratings

Teacher-rated results on the various outcome measures at pre-treatment and post-treatment for the treatment and control groups are presented in Table 7.

Three separate independent samples t-tests were conducted using the change scores (post-treatment minus pre-treatment mean scores) to explore the impact of the treatment on each of the three outcome measures: emotional competence, social skills and mental health, as measured by the EDQ-T, SSIS-T and the SDQ-T respectively. Participants were divided into two groups: treatment and control.

The first independent samples t-test conducted for the change score on the EDQ-T, found a statistically significant difference between the treatment (M = 18.18, SD = 21.57) and control groups (M = −6.19, SD = 28.72; t(114.5) = −5.30, $p < 0.001$, two-tailed; Bonferroni-adjusted α for comparison = 0.017). The magnitude of the difference in the means (mean difference = −24.38, 95% CI: −33.48 to −15.27) was large ($h^2 = 0.18$). There were no significant differences between the treatment and control group on the change scores for the SSIS-T (p = 0.129) or the SDQ-T (p = 0.995). Results are presented in Table 8.

3.2.1. Follow-up

Participants in the treatment group were followed up at 6 months post-treatment. Teacher rated results for the various treatment group outcomes measures at pre-treatment, post-treatment and 6 months follow-up are presented in Table 7.

To explore whether any treatment gains were maintained over time, three separate one-way repeated measures analyses of variance (ANOVA) were conducted for the treatment group's outcome measures: emotional competence, social skills and mental health as measured by the EDQ-T, SSIS-T and the SDQ-T. Each repeated measure ANOVA used three within subjects' time-points: mean scores at pre-treatment, post-treatment and 6 months follow-up.

For the EDQ, the one-way repeated measures ANOVA revealed a significant main effect of time [F(1,16) = 8.164, p = 0.004, $h^2 = 0.505$]. Post hoc repeated measures t-tests revealed a significant increase in scores from T1 to T2 [t(57) = −6.420, $p < 0.0001$; Bonferroni-adjusted α for comparison = 0.017], and no significant change in scores from T2 to T3 (p = 1.00). In

Table 7
Mean and standard deviations for teacher EDQ, SSIS, SDQ for treatment group at pre-treatment, post-treatment and 6-months follow-up and control group pre-treatment and post-treatment.

Outcome measure	Treatment			Control	
	Pre	Post	6-months follow-up	Pre	Post
Emotional competence: EDQ-T	109.45 (19.22) n = 99	123.77 (18.75) n = 62	121.43 (22.28) n = 30	114.10 (17.36) n = 107	108.20 (22.84) n = 66
Social skills: SSIS-T	85.45 (11.99) n = 98	89.14 (12.90) n = 63	86.30 (16.62) n = 30	85.08 (13.07) n = 103	86.37 (9.94) n = 62
Mental health: SDQ-T	16.35 (6.89) n = 97	13.50 (7.34) n = 56	16.50 (5.09) n = 30	17.98 (7.00) n = 103	15.47 (6.27) n = 60

Note: Standard deviations are presented in parentheses.

Table 8
Change scores for teacher EDQ, SSIS, SDQ for treatment and control groups.

Outcome measure	Treatment group change score	Control group change score	df	t	p
EDQ-T	18.18 (21.57) n = 58	−6.19 (28.72) n = 63	119	3.30	<0.001
SSIS-T	4.22 (11.59) n = 59	0.75 (13.16) n = 61	118	1.53	0.129
SDQ-T	−1.14 (6.44) n = 50	−1.14 (7.72) n = 50	102	0.01	0.995

Note: Change scores for outcome measures are the difference between post-treatment and pre-treatment scores.

addition, the difference in scores was significant from pre to post-treatment [t(57) = 2.71, p = 0.012]. This demonstrates that the positive effects of the treatment were sustained at follow-up. The one-way repeated measures ANOVA did not reveal a significant main effect of time for either the SSIS (p = 0.268) or the SDQ (p = 0.986).

3.3. Parent ratings

Parent-rated results on outcome measures at pre-treatment, post-treatment are presented in Table 9.

Three separate independent samples t-tests were conducted using change scores to examine the impact of treatment on the three outcome measures: emotional competence, social skills and mental health, as measured by the EDQ-P, SSIS-P and the SDQ-P respectively. Participants were divided into two groups: treatment and control.

The first independent samples t-test conducted for the change score on the EDQ-P did not reveal a statistically significant difference between the treatment and control groups (p = 0.401). There were also no significant differences between the treatment and control group on the changes scores for the SSIS-P (p = 0.127) or the SDQ-P (p = 0.214). Results are displayed in Table 10.

3.3.1. Follow-up

Participants in the treatment group were followed up at 6 months post-treatment. Parent rated results for the various treatment group outcomes measures at pre-treatment (T1), post-treatment (T2) and 6 months follow-up (T3) are presented in Table 9.

Table 9
Mean and standard deviations for parent EDQ, SSIS, SDQ for treatment group at pre-treatment, post-treatment and 6-onths follow-up and control group pre-treatment and post-treatment.

Table 10
Mean change scores for parent EDQ, SSIS, SDQ for treatment and control groups.

Outcome measure	Treatment group change score	Control group change score	df	t	p
EDQ-P	11.72 (19.96) n = 48	8.29 (19.63) n = 48	93	⊠0.84	0.40
SSIS-P	4.11 (9.68) n = 44	0.54 (11.72) n = 42	84	⊠1.54	0.13
SDQ-P	⊠2.07 (4.44) n = 42	⊠0.81 (5.02) n = 48	88	1.25	0.21

Note: Change scores for outcome measures are the difference between mean post-treatment and pre-treatment scores.

To examine whether treatment gains were maintained over time, three separate one-way ANOVAs were conducted, for the treatment group's outcome measures: emotional competence, social skills and mental health as measured by the EDQ-P, SSIS-P and the SDQ-P. Each repeated measure ANOVA used three within subjects' time-points: mean scores at pre-treatment (T1), post treatment (T2) and 6 months follow-up (T3). One-way repeated measures ANOVA on the EDQ-P ($p = 0.598$), SSIS-P ($p = 0.350$) or the SDQ-P did not reveal any significant main effect of time ($p = 0.181$).

4. Discussion

Overall, results of the current study found partial support for the primary hypothesis that delivering EBSST to students with ASD, their teachers and parents by school counsellors in schools would improve students' emotional competence, social skills and mental health. Teachers reported significantly improved emotional competency skills as measured by the EDQ in the treatment group, and the effect size was large. These gains were maintained at 6 months follow-up. For parents, although there were increases in EDQ scores in the treatment group from pre-treatment to post-treatment, the increase in scores was not statistically different from the control group, whose EDQ scores also improved. For both teacher and parent reported social skills and mental health, there was a trend for improvements in the treatment group. However, the treatment group did not improve statistically more than the control group across time.

These results suggest EBSST improved children with ASD's emotional competence skills for school based on teacher report, and these skills were maintained over time. The large effect size for this result underscored the significance of this finding obtained in a 'real world' setting and supported the practical utility of EBSST in schools.

Parents did not report the same improvements in emotional competence at home. There are several potential explanations for this finding. Firstly, previous research suggests children with ASD have difficulties generalising social–emotional skills across environments (Lord et al., 2001). As student EBSST sessions occurred at school, they may have had difficulties using these skills in the untrained home environment. Students may have been able to generalise skills from the group to the school setting because there were more opportunities for teachers compared with parents to facilitate practice and reinforcement of skills. The potential benefits of peer modelling outside the student sessions (e.g., in the playground and for some students in the classroom) could also have amplified the treatment effect in the school setting. Secondly, it may be that there were differences in parents' ability to observe their children in real life settings when compared to teachers, or differences in ability to report observations. It is also possible that parents' observations took place over a wider variety of situations compared to teachers which made parent-reported results less clear. That is, children might have responded more consistently in the school environment. Thirdly, the low level of parent reported treatment effects could be related to family factors. For example, rates of psychopathology in parents of children with ASD are high, and higher than for parents of children with other developmental disabilities (Emerson, Robertson, & Wood, 2004; Pisula, 2007). Future studies could explore family factors including parental mental health as a potential mediating variable in parent informant outcomes. Lastly, it is feasible that families may require more intensive training than teachers to support generalisation of EBSST skills to the home and community and this could be considered in future iterations of EBSST. In order to further increase generalisation, plans are currently underway to develop 'apps' of visual worksheets to be held on students' personal technology devices (e.g. iPads) to enhance consistency and continuity of implementation of the EBSST skills across school, home and community environments.

In comparison to the emotional competency domain, there were no significant treatment effects for teacher or parent reported social skills and mental health. This finding may suggest that EBSST had no effect on students' social skills or mental

emotional problem solving, emotion coaching and emotional regulations, which are all skills that are explicitly taught in EBSST. In comparison, the SSIS and SDQ, are designed for TD and do not explicitly evaluate emotional competence.

Further preliminary analysis of the EDQ as an outcome measure indicated that the EDQ had excellent internal consistency. There was low inter-rater agreement on the EDQ; however, the same was true for the SSIS and SDQ in this sample. Disagreements between informants do not necessarily indicate errors (Achenbach et al., 2008), but suggest that children are either functioning differently or there are perceived differences of functioning between home and school. In terms of concurrent validity, for teachers, the low correlations between the EDQ and the SSIS and SDQ may suggest that the EDQ is measuring different characteristics compared to the SSIS and SDQ at school. For parents, there was greater overlap between the measures. There was evidence of a large correlation between the EDQ and the SSIS and a medium correlation between the EDQ and the SDQ, suggesting that at home, domains of emotional competence, social skills and mental health were less distinguishable.

Given the limitations of existing measures in evaluating school-based social–emotional programmes, particularly programmes such as EBSST that target emotional competence for children with ASD, further rigorous evaluation of the EDQ is warranted. Additional studies are already underway specifically to further examine the reliability, validity and psychometric properties of both the EDQ-T and EDQ-P. The EDQ could have broader clinical applicability and appeal to clinicians and researchers interested in evaluating emotional development in children with ASD as well as children with other disabilities, emotional and/or behavioural issues and for TD children.

4.1. Limitations

This study included multi-method and multi-source measurement, establishment of group equivalence, and post-treatment follow-up assessment, consistent with 'gold standard' educational/psychological treatment research (Levin, O'Donnell, & Kratochwill, 2003). However, several limitations were evident. Firstly, it was not possible to check the fidelity of the small group treatments. This included school counsellor's adherence to the manualised programme, as well as student, teacher and parent attendance and participation in the treatment. Whilst there is no reason to assume lack of fidelity, if this had occurred difficulties in interpreting the data would arise. Future studies employing a clinic-based randomised-controlled trial could assist in determining whether any null findings are related to lack of treatment effects, rather than the possibility of lack of fidelity as is possible in a 'real world' field trial.

It was not possible to randomly assign participants or undertake blind assessments. The measures used in this evaluation all relied upon ratings of typical behaviour collected through teacher and parent informant report, and these informants also received the EBSST treatment, which means their reports may be subject to bias. In addition, teachers may have had additional bias given their proximity and additional exposure treatment conditions (students being withdrawn from class five times, in three school terms) relative to parents. Six month follow-up data was collected following the 6 month booster session, and this may have influenced both parent and teacher informant responses. Future studies with access to significantly more financial and staff resources than available for this study, could utilise random assignment, direct, blinded outcome measures and remove the control condition from class for the same amount of time as the treatment condition and work on an alternative task.

The response rate for the outcome measures was low for teachers and more so parents. School counsellors were required to collect data at pre-treatment and post-treatment and six months follow-up for all students in their groups, as well as running student, teacher and parent groups in addition to their typical duties. Given the nature of the field trial and demands on the school counsellors, the response rate is higher than might have been expected. Plans are currently underway to utilise 'apps' and personal technology devices (e.g. iPads) to collect informant ratings to facilitate a higher response rate for outcome measures in future studies.

4.2. Clinical implications & future research

The current findings have several important potential clinical implications for students with ASD, their teachers and parents. EBSST aims to improve emotional competence in children with ASD. For students, EBSST was found to improve emotional competence at school. Given research that suggests social–emotional skills at school are associated with a range of positive mental health, social and academic outcomes in TD students (Humphrey et al., 2007), EBSST has the potential to significantly improve quality of life for students with ASD. EBSST also has potential clinical applications to other client populations who have emotional skills deficits such as children with Fragile X Syndrome (Williams, Porter, & Langdon, 2014). For teachers, and school staff there is currently a dearth of evidence-based interventions designed to teach social–emotional

ASD and Intellectual Disability (ID) co-vary at very high rates. Despite this, much of the intervention research is conducted on students with ASD without ID (Matson & Shoemaker, 2009). EBSST has already been modified for school-aged students with ASD and Mild ID, and is currently being evaluated in a treatment versus control trial. Students with ASD, who also have ID, their teachers and parents are also likely to benefit from an intervention to develop emotional competence in a similar fashion to their peers with ASD without co-occurring ID and this should be explored in future research.

4.3. Conclusion

The current study is the first large systematic investigation of EBSST–a novel social-emotion programme for children with ASD, delivered by school counsellors within mainstream Australian primary schools. Results suggested that EBSST significantly improved emotional competence at school, as measured by the EDQ, and gains in emotional competence were maintained over time. The large effect size was noteworthy. The significant findings obtained under uncontrolled 'real-world' conditions, support the practical and clinical utility of delivering EBSST in schools to children with ASD. More general measures of social skills and mental health did not detect statistically significant change. These findings underscore the shortage of reliable, valid and psychometrically sound tests to evaluate social–emotional programmes for children with ASD in schools. The current study provided a valuable basis for future research and development evaluating both EBSST and the EDQ.

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